

Teacher Notes – KEY

CRS	FUN 703 - Exhibit knowledge of unit circle trigonometry.
Objective	10.13 – Find exact values of the 6 trigonometric functions(4) 10.14 – Find reference angles(2) 10.15A – Determine the quadrant [including naming quadrants as an interval] of an angle given the sign(s) of trig function(s) (4) 10.15B - Evaluate the 6 trigonometric functions of any angle using reference angles 10.16 – Evaluate inverse trig functions (4)

Homework Review:

1) Solve the equation for θ without a calculator. Give your answer in both radians and degrees. $\tan \theta = (-\sqrt{3})$	2)) Solve the equation for θ without a calculator. Give your answer in both radians and degrees. $\cos \theta = (-\frac{1}{2})$	3)) Solve the equation for θ without a calculator. Give your answer in both radians and degrees. $\sin \theta = (-\frac{\sqrt{3}}{2})$
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Quotient Identities:

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

Ex. Prove the cotangent identity.

Pythagorean Identities:

$$\sin^2 \theta + \cos^2 \theta = 1$$

Ex. $(\sin 45^\circ)^2 + (\cos 45^\circ)^2 = 1$ Prove your answer.

Reciprocal Identities:

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

Be able to do the same with these ratios.

Name: Key TP: _____

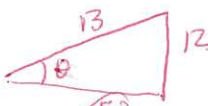

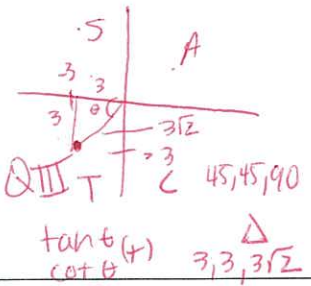
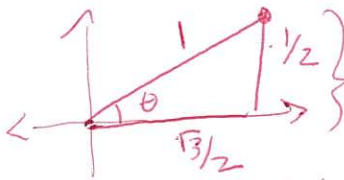
CW#71H: Application/Review 10.13-10.16
Honors Geometry

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Homework Review:

1) Solve the equation for θ without a calculator. Give your answer in both radians and degrees. $\tan \theta = (-\sqrt{3})$ $\tan^{-1} \theta =$ $-90^\circ < \theta < 90^\circ$ $\theta = -60^\circ$ <i>net equal to b/c θ is undefined at 90°!</i>	2) Solve the equation for θ without a calculator. Give your answer in both radians and degrees. $\cos \theta = (-\frac{1}{2})$ <i>\cos^{-1} domain $0^\circ \leq \theta \leq 180^\circ$</i> $\theta = 120^\circ$	3) Solve the equation for θ without a calculator. Give your answer in both radians and degrees. $\sin \theta = (-\frac{\sqrt{3}}{2})$ <i>$\sin^{-1} \theta =$ $-90^\circ \leq \theta \leq 90^\circ$</i> $\theta = -60^\circ$
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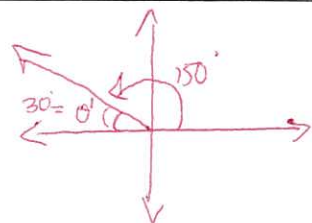
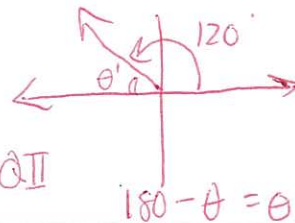
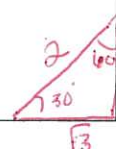
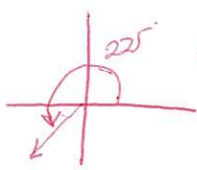
Objective 10.13: Find the exact value of each of the remaining trigonometric functions of θ .

1. $\sin \theta = \frac{12}{13}$ $\csc \theta = 13/12$ $\sec \theta = 13/5$ $\cos \theta = 5/13$ $\cot \theta = 5/12$ $\tan \theta = 12/5$  (5) ← Pythagorean thm	2. $\cos \theta = -\frac{4}{5}$ → if $\cos \theta < 0$ then $\sec \theta < 0$ $\tan < 0$ b/c $\tan \theta = \frac{\sin \theta}{\cos \theta}$ $\csc \theta = 5/3$ $\tan \theta = -3/4$ <i>* there is no quadrant where all trig functions are (-) thus \sin must be (+)</i> $\cot \theta = -4/3$  (3) ← Pythag theorem
3. $(-3, -3)$ $\sin \theta = \frac{-3}{3\sqrt{2}} = -\frac{\sqrt{2}}{2}$ $\cos \theta = -\frac{\sqrt{2}}{2}$ $\tan \theta = \frac{-3}{-3} = 1$ $\cot \theta = 1$ $\sec \theta = -\frac{3\sqrt{2}}{3} = -\sqrt{2}$ $\csc \theta = -\sqrt{2}$  QIII T C 45, 45, 90 tan θ (+) Δ 3, 3, $3\sqrt{2}$	4. $(\frac{\sqrt{3}}{2}, \frac{1}{2})$ $\sin \theta = \frac{1}{2}$ $\cos \theta = \frac{\sqrt{3}}{2}$ $\tan \theta = \frac{1}{\sqrt{3}}$ $\sec \theta = \frac{2}{\sqrt{3}}$ $\csc \theta = 2$ $\cot \theta = \sqrt{3}$  Unit circle values in Q1 all are positive.

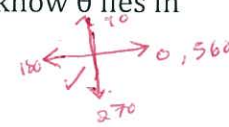
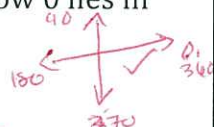
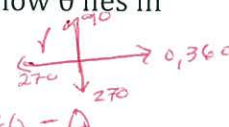

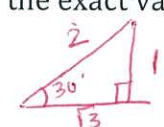
* Notice these are the same values for a $45^\circ \Delta$ in QI and QIII ... Hmn...

Objective: 10.14 – Find reference Angles

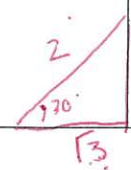
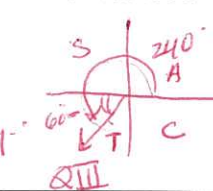
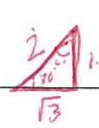
Find the reference angle of each angle. **GRAPH THE ANGLES IN THE COORDINATE PLANE.**

<p>5. 150°</p> <p>in QII $180 - \theta = \theta'$</p> 	<p>6. 120°</p> <p>in QII $180 - \theta = \theta'$</p> 
<p>7. Rewrite the expression using reference angles and then solve.</p> <p>$\frac{17\pi}{6} * \frac{30180}{\pi} = 510^\circ$</p> <p>$\sin 135^\circ + \cos 17\pi/6 + \tan (-\pi/3)$</p> <p>$(\sin 45^\circ) + \cos(30^\circ) + (\tan -60^\circ)$</p> <p>$(\frac{\sqrt{2}}{2}) + (\frac{\sqrt{3}}{2}) + (-\frac{\sqrt{3}}{1})$</p> <p>$= \frac{\sqrt{2} - \sqrt{3}}{2}$</p> 	<p>8. $\frac{5\pi}{4}$</p> <p>$\frac{5\pi}{4} * \frac{180}{\pi} = 225^\circ$</p> <p>$4 \sqrt{180} = 4 \sqrt{90} = 4 \sqrt{9 \cdot 10} = 4 \cdot 3 \sqrt{10} = 12\sqrt{10}$</p> <p>$\theta' = 45^\circ$</p> <p>$5 * 45 = 225^\circ = \frac{5\pi}{4}$</p> <p>in QIII $\{ \theta - 180 = \theta' \}$</p> 

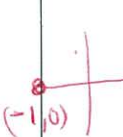
Objective: 10.15a – Determine the quadrant [including naming quadrants as an interval] of an angle given the sign(s) of trig function(s) (4)

<p>Directions: Name the quadrants for the following reference angles, given the inequalities.</p> <p><u>Ref angle</u> = the acute angle formed by θ and the x-axis.</p>	<p>9. If $180^\circ < \theta < 270^\circ$, then we know θ lies in which quadrant?</p> <p>QIII</p> <p>And the reference angle $\theta' = \theta - 180^\circ$</p> 
<p>10. If $270^\circ < \theta < 360^\circ$, then we know θ lies in which quadrant?</p> <p>QIV</p> <p>And the reference angle $\theta' = 360 - \theta$</p> 	<p>11. If $90^\circ < \theta < 180^\circ$, then we know θ lies in which quadrant?</p> <p>QII</p> <p>And the reference angle $\theta' = 180 - \theta$</p> 
<p>12. Practice Quiz Question: Find the remaining 6 trig functions of θ given the following:</p> <p>in QIV $\sec \theta = 2, \sin \theta < 0$</p>  <p>Explain how you determined the quadrant of θ and include a graph of your triangle with $\sec \theta = 2$.</p> <p>$2^2 = b^2 + 1^2 = 3^2 = b^2 \Rightarrow b = \sqrt{3}$</p> <p>$\sin \theta = -\frac{\sqrt{3}}{2}, \cos \theta = \frac{1}{2}, \tan \theta = -\frac{\sqrt{3}}{1} = -\sqrt{3}, \cot \theta = -\frac{1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}, \sec \theta = 2, \csc \theta = \frac{2}{-\sqrt{3}} = -\frac{2\sqrt{3}}{3}$</p>	<p>13. Practice Quiz Question: Find the exact value for the following:</p> <p>We're in QII $\sin 510^\circ$</p>  <p>#7. $510 = 30^\circ$ ref Δ</p> <p>$\sin 30 = \frac{1}{2}$ ✓ \sin is + in QII</p> <p>Explain how you determined the quadrant of θ and include a graph of your triangle.</p>

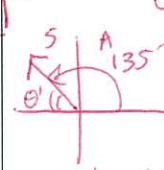
Objective: 10.15B - Evaluate the 6 trigonometric functions of any angle using reference angles


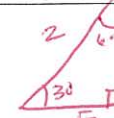
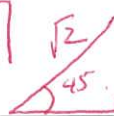
<p>14. $\sin 510^\circ = \frac{1}{2}$ $\cos \theta = \cos 30^\circ = \frac{\sqrt{3}}{2}$</p> <p>Repeat Question</p> <p>in QII \sin and \csc (+)</p> <p>$\tan \theta = \frac{\sqrt{3}}{3}, \cot \theta = \frac{3}{\sqrt{3}} = \sqrt{3}, \sec \theta = \frac{2}{\sqrt{3}}, \csc \theta = 2$</p> 	<p>15. $\cos 600^\circ$</p> <p>Always graph the angle to see where its signs fall</p> <p>$\cos 600^\circ = \cos 60^\circ = \frac{1}{2}$</p>  
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16. $\cos 540^\circ - \tan(-405^\circ)$
 $\cos(180^\circ) - \tan(45^\circ)$
 $\cos(0^\circ) - (-1)$
 $-1 + 1 = \boxed{0}$

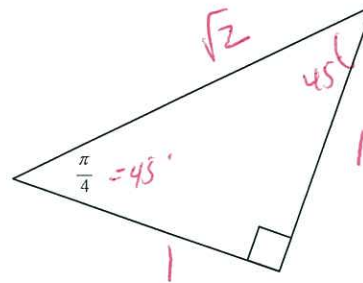
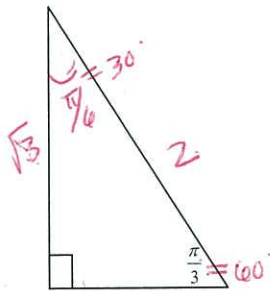


17. $6\cos\left(\frac{3\pi}{4}\right) + 2\tan\left(-\frac{\pi}{3}\right)$
 $6\cos(135^\circ) + 2\tan(-60^\circ)$
 $6\left(-\frac{\sqrt{2}}{2}\right) + 2(-\sqrt{3})$
 $-3\sqrt{2} + (-2\sqrt{3}) = \boxed{-3\sqrt{2} - 2\sqrt{3}}$
 $\theta' = 45^\circ \text{ and } \cos(\pi)$



Fill in the ratios for the special right triangles given the location of the marked angle. Use these ratios to help you answer 18-23



Objective: 10.6 Evaluate inverse trig functions (4)

<p>18. $\cos^{-1} \frac{\sqrt{3}}{2} = \frac{\text{adj}}{\text{hyp}}$ <i>using special right triangles</i> $\theta = \underline{30}$ in degrees $\theta = \underline{\pi/6}$ in radians</p>	<p>19. $\tan^{-1} \frac{\sqrt{3}}{1} = \frac{\text{opp}}{\text{adj}}$ <i>using special right triangles</i> $\theta = \underline{60}$ in radians $\theta = \underline{\pi/3}$ in degrees</p>
<p>20. $\sec^{-1} \frac{\sqrt{2}}{1} = \frac{\text{hyp}}{\text{adj}}$ $\theta = \underline{45}$ in radians $\theta = \underline{\pi/4}$ in degree</p>	<p>21. $\cot \theta = 1 = \frac{\text{adj}}{\text{opp}}$ $\theta = \cos^{-1}(1)$ $\theta = \underline{45}$ in radians $\theta = \underline{\pi/4}$ in degrees</p>
<p>22. CHALLENGE EXAMPLE: Solve for x $\sin^{-1}(x-1) = \frac{\pi}{4}$ \rightarrow (To free the "x-1" I take the sin of both sides) $(x-1) = \sin \frac{\pi}{4}$ (sub in the values I know) $x = 1 + \frac{\sqrt{2}}{2}$ Easy enough!</p>	<p>23. CHALLENGE PROBLEM: You try! <i>Will not be on the quiz</i> Solve for x in the expression: $\tan^{-1}(x+2) = 1$ <i>← angle</i> $\tan(\tan^{-1}(x+2)) = \tan(1)$ <i>side length</i> $x+2 = \tan(1)$ $x = \tan(1) - 2$ Rad or -1.98° $x \approx -4.43$</p>